

Service Manual

SINGER^{*}

211 A_{UTT}

212 A_{UTT}

CONTENTS

	<u>PAGE</u>
1 . SPECIFICATIONS	2
2 . SPEED AND MOTOR PULLEY	3
3 . DESCRIPTION OF THREAD TRIMMING OPERATION	4
4 . TO ASSEMBLE AND ADJUST THREAD TRIMMER	6
4- 1. MATTERS REQUIRING ATTENTION DURING ADJUSTMENT OF THREAD TRIMMER	6
4- 2. TO CHECK AND ADJUST NEEDLE STOP POSITION	6
4- 3. TO TIME AND ADJUST TRIMMER CAM	8
4- 4. TO ADJUST TRIMMER POSITIVE MOTION CAM	8
4- 5. TO ASSEMBLE AND ADJUST TRIMMER SOLENOID BRACKET	9
4- 6. CLEARANCE BETWEEN TRIMMER POSITIVE MOTION CAM FOLLOWER PIN AND TRIMMER CAM	10
4- 7. TO ASSEMBLE AND ADJUST TRIMMER ROD [FOR DRIVING ARM (LEFT) AND (RIGHT)]	10
4- 8. TO ASSEMBLE AND ADJUST THREAD PULLER	12
4- 9. TO ADJUST THREAD PULLER SUPPORT	12
4-10. TO POSITION THREAD PULLER	13
4-11. TO ADJUST TRAPPER	14
4-12. TRAPPER - BOBBIN THREAD HOLDING POWER	14
4-13. TO ASSEMBLE AND ADJUST STATIONARY KNIFE	14
4-14. SHARPENING STATIONARY KNIFE	15
4-15. TO ADJUST PRESSURE OF KNIFE	15

5 . DESCRIPTION OF TENSION RELEASING OPERATION	1 6
6 . TO ASSEMBLE AND ADJUST TENSION RELEASING OPERATION	1 7
6- 1. TO ASSEMBLE AND ADJUST TENSION RELEASING CAM	1 7
6- 2. TO TIME AND ADJUST TENSION RELEASE PLATE ROD	1 8
6- 3. OPENING OF TENSION DISCS VIA TENSION RELEASING RING	1 8
7 . TO ASSEMBLE AND ADJUST BACK TACK SOLENOID	1 9
8 . TO ASSEMBLE AND ADJUST WIPER	2 0
9 . MATTERS REQUIRING ATTENTION DURING TRIMMING OPERATION	2 1
9- 1. ANTI-SPILL SPRING	2 1
9- 2. NEEDLE THREAD TAIL REMAINING AT NEEDLE POINT	2 1
9- 3. TO PREVENT THREAD FROM PULLING OUT OF NEEDLE AT START OF SEWING	2 1
1 0 . TROUBLE SHOOTING GUIDE	2 2

※ We recommend that this manual be used together with Service Manual Form U3219 for 211U and Form U3420 for 212U.

1. SPECIFICATIONS

211A SERIES

Varieties		211A 157JA	211A 157KA	211A 165JA	211A 166JA	211A 166KA	211A 967JB	211A 967KB
Auto. Back Tack Device		—	○	—	—	○	—	○
Max. Speed (s.p.m)		4,000		3,500	2,900		2,700	
Max. Stitch Length (mm)		4.2		7.3	5.1		7.3	
Presser Bar Lift	Hand (mm)	6.4		8.0				
	Knee (mm)	9.5		12.7				
Needle		Cat.1955-01 #20		Cat.3355-01 #22				
Hook (One-Piece Auto- Lubrication Type)	Standard size	○					—	
	2.0 Times Size	—					○	
Bobbin Case Type	Latch Type	Standard						
	Cap Type	Optional						
Trimming Speed (s.p.m)		180 ±20						
Back Tack Speed (s.p.m)		—	1,000 ±200	—	—	1,000 ±200	—	1,000 ±200
Thread Trimmer		Sickle-Type						
Trimmer Driving System		Solenoid and cam controlled						
Tension Releasing System		Solenoid and cam controlled						
Oil		Singer type " C " oil						

212A SERIES

Varieties		212A 141BA	212A 141GA	212A 541BA	212A 541GA	212A 143BA	212A 143GA	212A 543BA	212A 543GA	212A 939JA	212A 939KA
Auto. Back Tack Device		—	○	—	○	—	○	—	○	—	○
Max. Speed (s.p.m)		4, 000		2, 700		3, 000		2, 700			
Max. Stitch Length (mm)		4. 2									5. 1
Presser Bar Lift	Hand (mm)	6. 4									8. 0
	Knee (mm)	9. 5									12. 7
Needle Gauge (*... Standard)		3. 2mm *4. 8mm *6. 4mm 7. 9mm 9. 5mm 25. 4mm (1/8mm), (3/16in), (1/4in), (5/16in), (3/8in), (1in)									
Needle		Cat.1955-01 #20		Cat.1955-01 #21		Cat.1955-01 #20		Cat.1955-01 #21		Cat.3355-01 #20	
Hook (One-Piece Auto- Lubrication Type)	Standard size	○		—		○		—		—	
	1.8 Times Size	—		○		—		○		—	
	2.0 Times Size	—		—		—		—		○	
Bobbin Case Type	Latch Type	Standard				—				Standard	
	Cap Type	Optional				Standard				Optional	
Trimming Speed (s.p.m)		180±20									
Back Tack Speed (s.p.m)		—	1,000 ±200	—	1,000 ±200	—	1,000 ±200	—	1,000 ±200	—	1,000 ±200
Thread Trimmer		Sickle-Type									
Trimmer Driving System		Solenoid and cam controlled									
Tension Releasing System		Solenoid and cam controlled									
Oil		Singer type " C " oil									

2. SPEED AND MOTOR PULLEY

• Speed

Machine Varieties	Maximum Speed
211A157JA/157KA	4,000 SPM
211A165JA	3,500 SPM
211A166JA/166KA	2,900 SPM
211A967JB/967KB	2,700 SPM
212A141BA/141GA	4,000 SPM
212A541BA/541GA	2,700 SPM
212A143BA/143GA	3,000 SPM
212A543BA/543GA	2,700 SPM
212A939JA/939KA	2,700 SPM

• Motor Pulley

Relations between sewing speed, motor pulley (O.D.) and frequency. (2-pole motor)

O.D. of Motor Pulley(mm)		65	70	75	85	90	100
Speed (SPM)	50Hz	2,560	2,760	2,960	3,360	3,550	3,950
	60Hz	3,070	3,310	3,550	4,020	—	—

Use M type V-belts

Note: To assure reliable thread trimming when sewing with size #8 thread or heavier, use motor pulley smaller than 70mm.

3. DESCRIPTION OF THREAD TRIMMING OPERATION

- 1) When the trimming solenoid is energized by thread trimming signal, the solenoid arm rotates and the trimmer lever shaft moves toward the top surface of the bed.
- 2) The trimmer cam roller slides into the groove in the trimmer cam as the trimmer lever shaft moves upward.
- 3) When the machine is run a little, a pin on the trimmer positive motion bracket fitted to the trimmer lever shaft (with tension release driving lever) moves into the groove provided on the trimmer positive motion cam, thereby controlling up and down motion of the trimmer lever shaft.
- 4) Trimmer lever oscillates back and forth in the direction of "A" as the roller moves along the groove in the trimmer cam.
- 5) The motion of the trimmer lever in the direction of "A" is transmitted to the thread puller driving arm via trimmer rod.
- 6) The rotating movement of the driving arm enables the thread puller to start its oscillating motion.
- 7) The motion of the thread puller is controlled by the trimmer cam and when the trimmer cam roller reaches the return point on the trimmer cam, the motion of each part is reversed.
- 8) When the thread puller reaches the mid-point on its return stroke, a roller on the tension release driving lever which is fitted to the trimmer lever shaft, comes in contact with the tension releasing cam, allowing tension releasing motion to start.
- 9) The thread puller continues to be on its return stroke and after needle and bobbin threads have been cut with stationary knife, returns to its rest position. At the same time, the trimmer solenoid is turned "OFF".
- 10) After the machine has been run a little, the trimmer positive motion bracket is released from the trimmer positive motion cam, and the trimmer lever shaft returns to its rest position by the spring action of the trimmer lever shaft spring. This completes one trimming cycle.

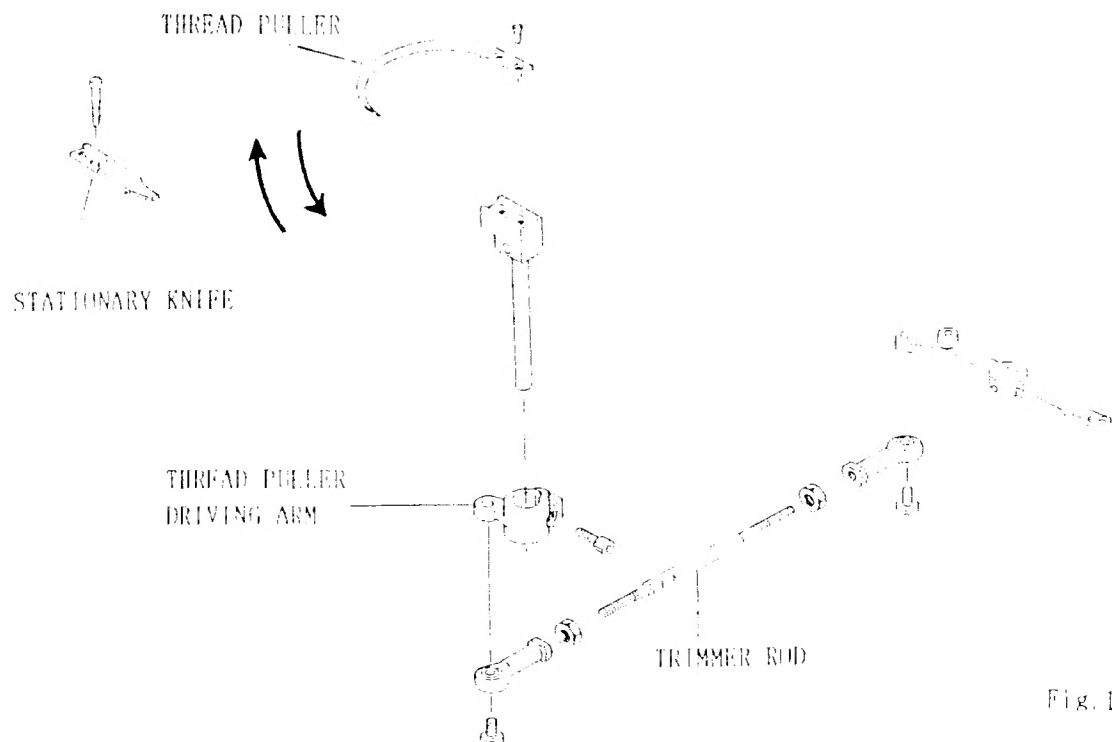
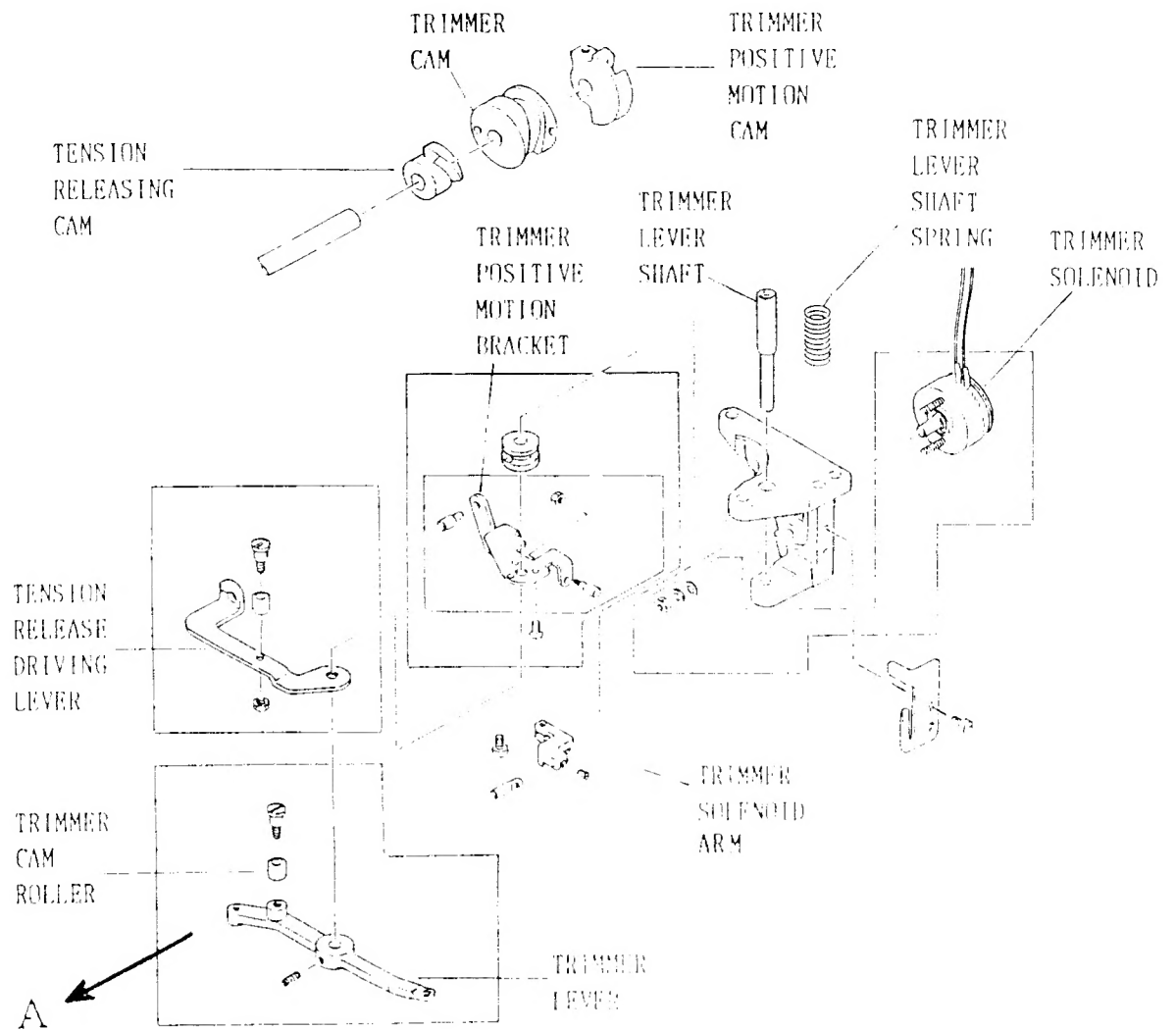


Fig. 1

4. TO ASSEMBLE AND ADJUST THREAD TRIMMER

4-1. MATTERS REQUIRING ATTENTION DURING ADJUSTMENTS OF THREAD TRIMMER

- When checking the operation of the thread trimmer manually, care should be taken on the following points.

- 1) Be sure to turn machine pulley toward operator.
- 2) Raise the trimmer lever shaft from the point where the needle bar is approximately 2.54mm above its lower dead point.

Note: The trimmer lever shaft will not function when raised from other points because the trimmer positive motion cam follower pin interferes with the trimmer positive motion cam.

- Before adjusting the thread trimmer, check the sewing machine to make sure that the machine is adjusted properly as a lockstitch machine.
- Since thread trimmer parts are related to each other, check and adjust each part in the order of adjustments described in this manual.

4-2. TO CHECK AND ADJUST NEEDLE STOP POSITION

- When checking or adjusting the needle stop positions, connect only the connector for synchronizer leading out from the machine to the control box.
- Needle stop positions

1) Lower needle stop position

The lower needle stop position is approximately 2.54mm above the lower dead point of the needle on its upward stroke. This position does not call for absolute accuracy and minor adjustment of the sensor plate may be made if the threads cannot be trimmed due to skip stitching.

2) Upper needle stop position

The upper needle stop position is when the take-up lever is at its upper dead point. Before checking the upper needle stop position, set switch in control box to needle up position. Run and stop the machine several times in order to set the upper stop position as accurately as possible.



Fig.2

- All sensors are correctly timed and set before leaving the factory. If, however, this timing or setting has been disturbed and retiming or resetting becomes necessary, adjust by correctly positioning the sensor plates.

- 1) The positions of the sensor plates (for upper and lower needle positions and for controlling the trimmer solenoid) in relation to the sensor set screw A should be as shown in Fig.3. To adjust the position of a sensor plate, loosen screw on right end of the sensor and turn sensor plate as required, then tighten the screw.

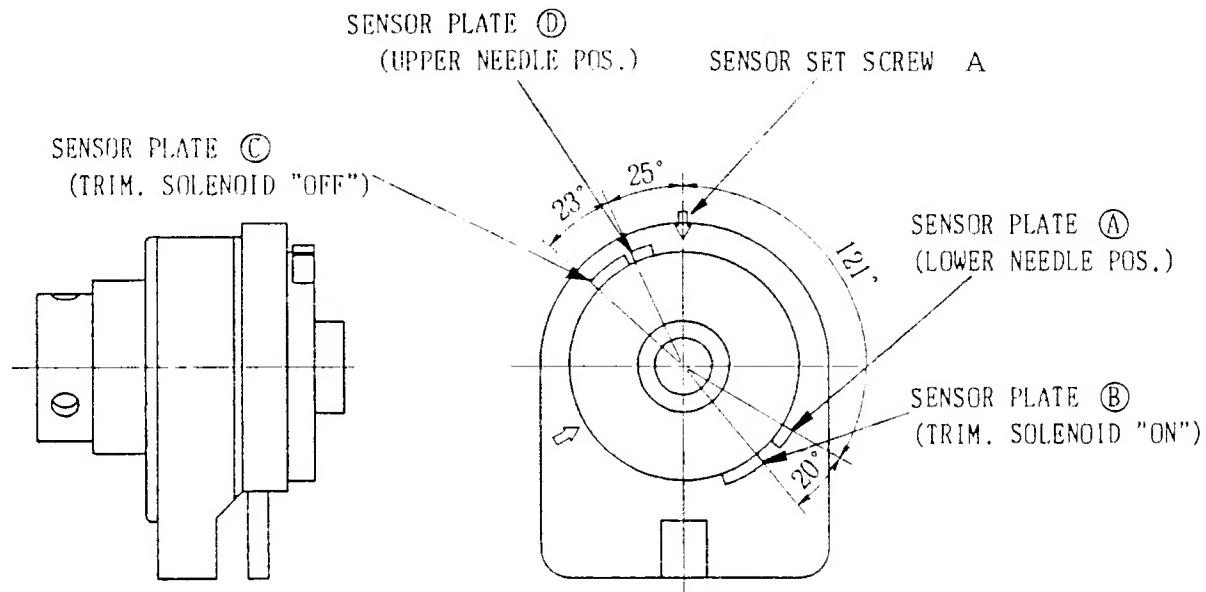


Fig.3

- 2) Align sensor set screws with the timing mark on the machine pulley and securely tighten two set screws.

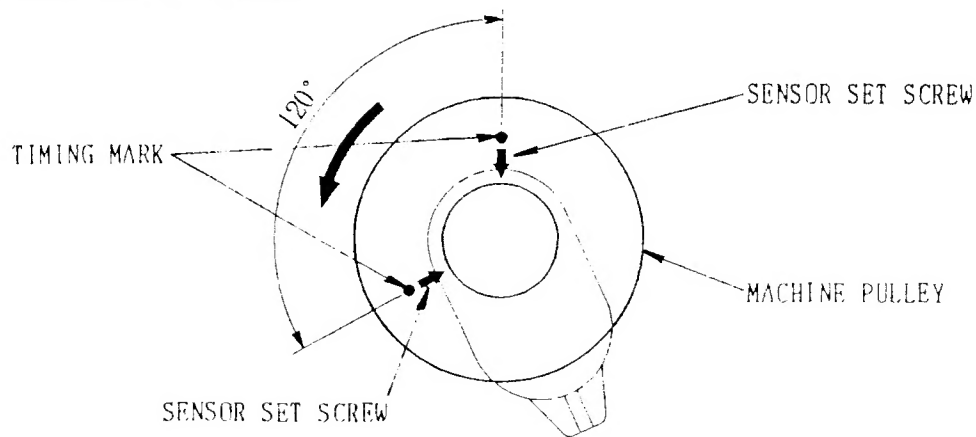


Fig.4

- 3) Use sensor retainer supplied with the machine and be sure it is correctly secured in position.

4-3. TO TIME AND ADJUST TRIMMER CAM

- The trimmer cam should be positioned lengthwise 70.5mm from the end face of the boss adjacent to the feed driving eccentric connection.
- Follow the procedures described below when making this adjustment.

- 1) Loosen two set screws which fix the trimmer cam.
- 2) Move the trimmer cam to the left or right as required so that the distance between the cam and boss becomes 70.5mm. Then, pinch tighten the set screws.

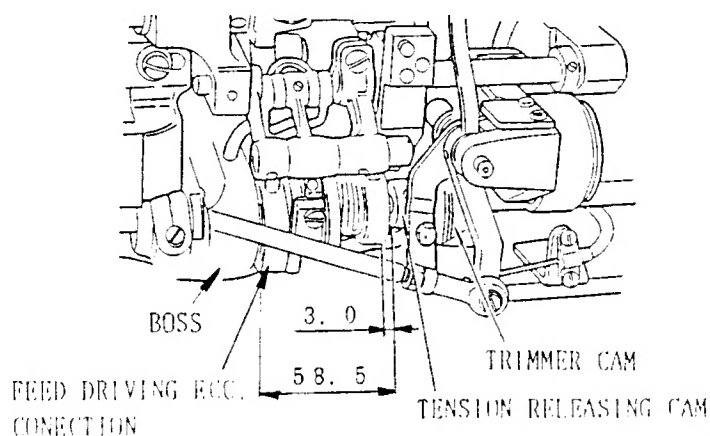


Fig. 5

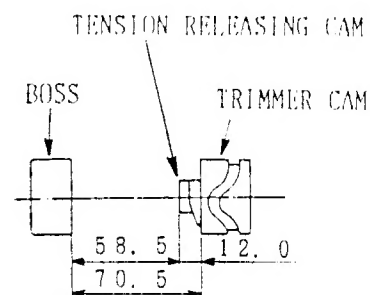


Fig. 6

- Adjust timing of trimmer cam in the manner described below.

- 1) Turn the machine pulley until the needle bar is approximately 2.5mm above its lower dead point.
- 2) Turn the trimmer cam until the timing mark on the trimmer cam is aligned with the center of the trimmer cam roller and then, tighten two set screws securely.

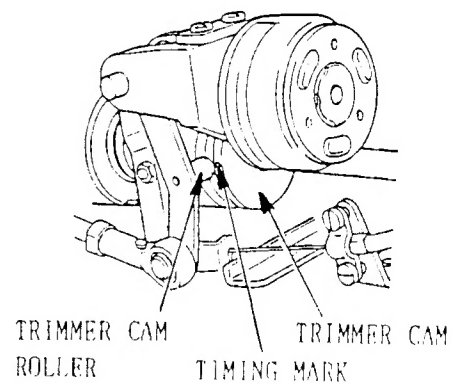


Fig. 7

4-4. TO ADJUST TRIMMER POSITIVE MOTION CAM

- The trimmer positive motion cam should be assembled to the trimmer cam without clearance between the two parts.
- Correct timing of the trimmer positive motion cam is obtained by aligning the notch provided on the trimmer cam with the end face of the trimmer positive motion cam.

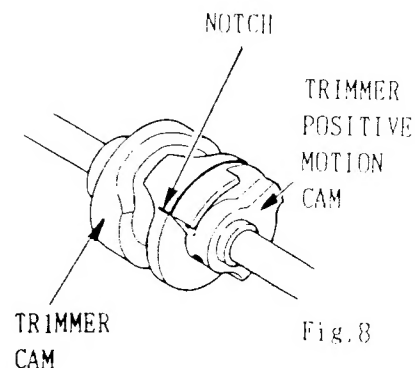


Fig. 8

- To adjust timing, loosen two set screws.

Note: The trimmer positive motion cam is to hold the trimmer positive motion cam follower pin in the groove provided on the cam and also to control up and down movement of the trimmer lever shaft.

If the trimmer positive motion cam is not properly timed, the following situation may occur.

When timing is too fast ----- The trimmer lever shaft returns before the thread puller returns to its rest position.

When timing is too slow ----- The machine stops with the trimmer lever shaft remaining in raised position even after completion of trimming operation.

4 - 5. TO ASSEMBLE TRIMMER SOLENOID BRACKET

- Trimmer solenoid bracket is correctly adjusted at the factory before shipment.
 - In case it becomes necessary to make adjustment, follow the procedure described below.
- 1) The stroke of the trimmer lever shaft should be 8.8mm.
The trimmer solenoid arm stopper controls the stroke of the trimmer lever shaft. Move this stopper up and down as required to adjust the stroke.
 - 2) Clearance between the trimmer solenoid arm pin and the boss for the trimmer positive motion bracket should be 1.0mm.
 - 3) Clearance between the trimmer solenoid arm and trimmer solenoid bracket should be 1.0mm.

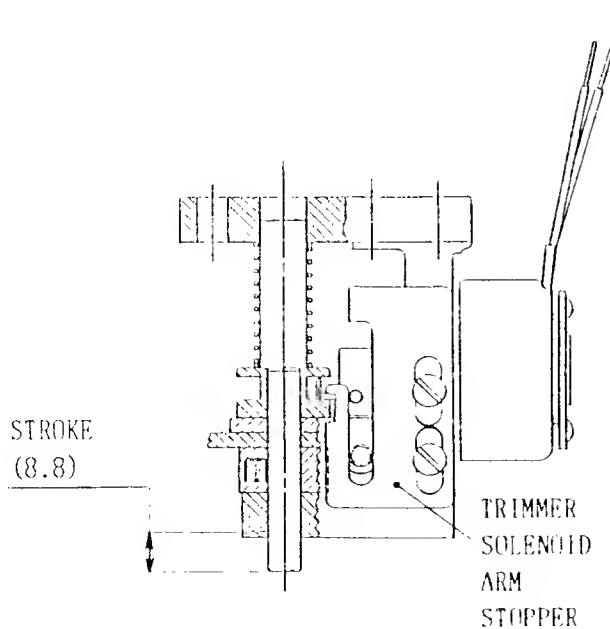


Fig. 9

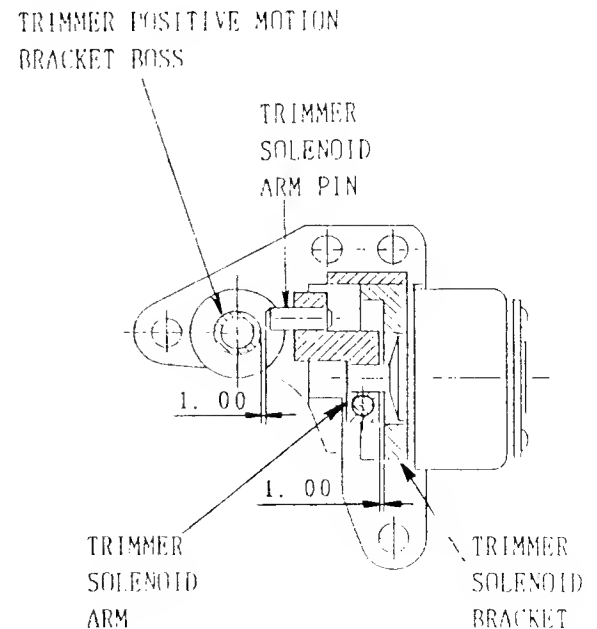
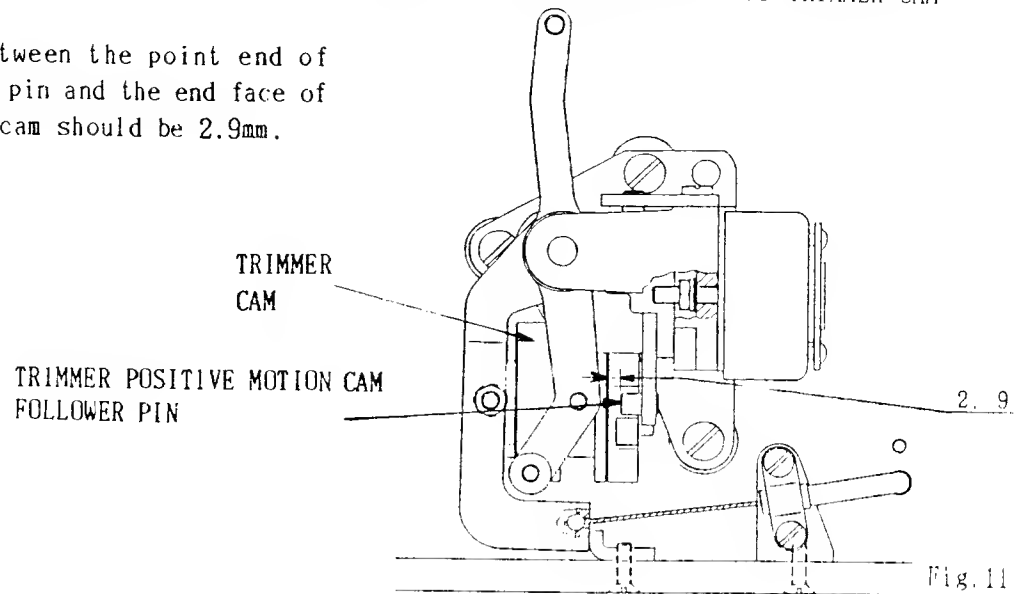


Fig. 10

4-6. CLEARANCE BETWEEN TRIMMER POSITIVE MOTION CAM FOLLOWER PIN AND TRIMMER CAM

- Distance between the point end of the follower pin and the end face of the trimmer cam should be 2.9mm.



4-7. TO ASSEMBLE AND ADJUST TRIMMER ROD [FOR DRIVING ARM (LEFT) AND (RIGHT)]

- This adjustment should be made with the needle bar positioned between its lowest point and needle bar height of 2.54mm.

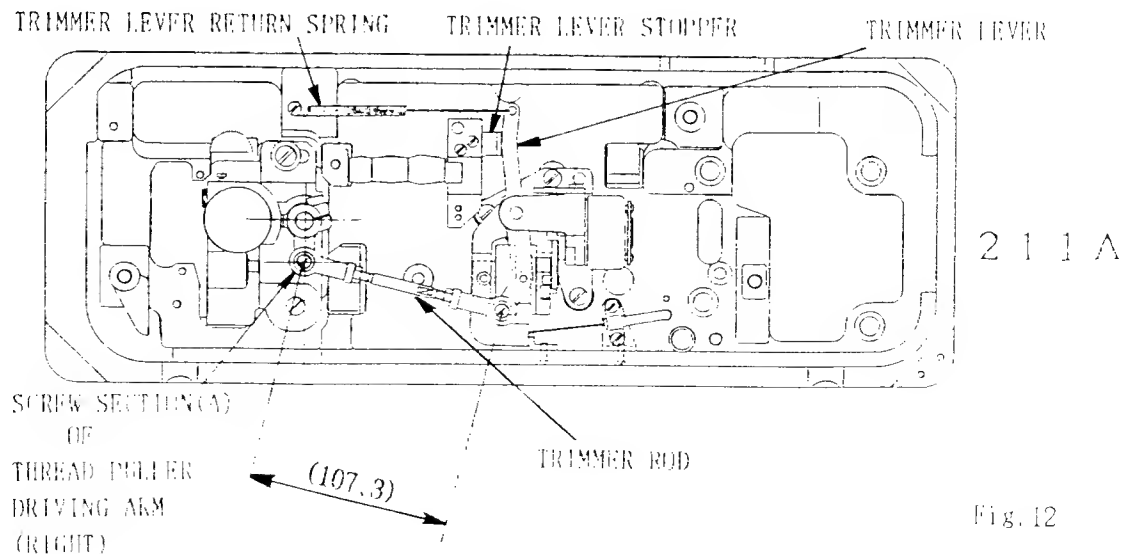
1) To assemble trimmer lever stopper and trimmer lever return spring (211A/212A)

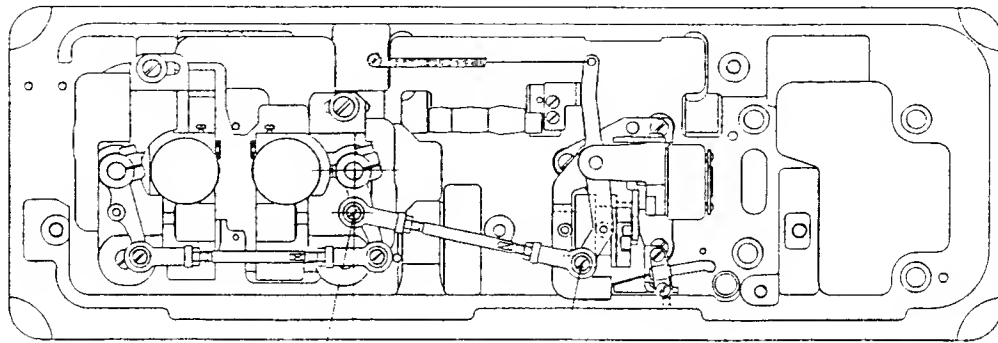
Set the position of the trimmer lever with the trimmer lever stopper so that the trimmer cam roller will smoothly slide into the groove on the trimmer cam when the trimmer lever shaft is pushed against the trimmer cam, with the needle bar raised 2.54mm from its lowest point.

After above adjustment, assemble trimmer lever return spring.

2) To assemble trimmer rod [for driving arm (right)] (211A/212A)

Assemble trimmer rod [for driving arm (right)] so that the screw section (A) of the thread puller driving arm (right) is just under the hook saddle.

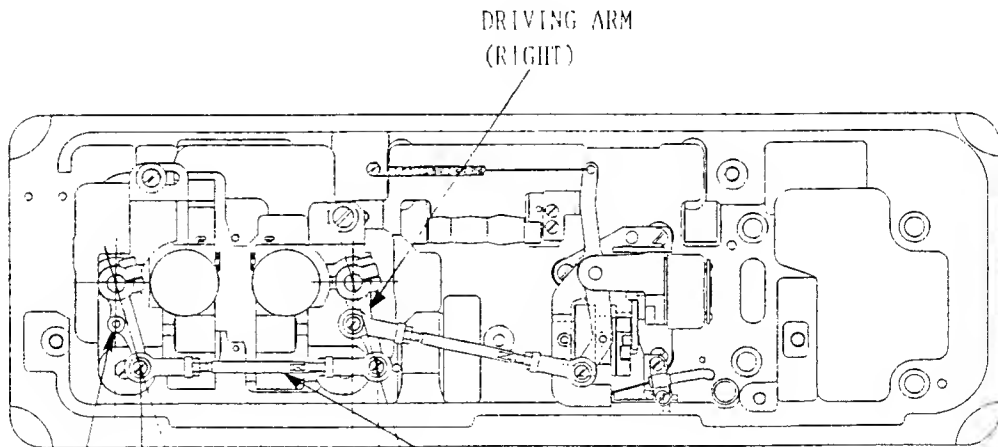




2 1 2 A

Fig. 13

- 3) To assemble trimmer rod [for driving arm (left)] (212A only)
 Assemble trimmer rod [for driving arm (left)] so that thread puller driving arm (left) and (right) will be parallel with each other.



2 1 2 A

DRIVING ARM
(LEFT)

2" Gauge
 Rod 5 1/2" overall
 5 1/2"

Fig. 14

4 - 8 . TO ASSEMBLE AND ADJUST THREAD PULLER

- Thread puller must be on a level with bobbin case stop finger. Distance from bed shaft to top surface of thread puller should be 43.3mm.

- Follow the procedures described below when adjustment is made.

- 1) Loosen stationary knife set screws and remove stationary knife.
- 2) Loosen thread puller driving arm screw and turn the thread puller clockwise until trapper set screw becomes visible.
- 3) Loosen trapper set screw and remove trapper.
- 4) Turn thread puller counter-clockwise and check to see whether the thread puller is flush with the top surface of the bobbin case stop finger.
- 5) In case adjustment is necessary, loosen thread puller retainer bracket shaft collar set screw and adjust the position of the thread puller to the specified dimension.

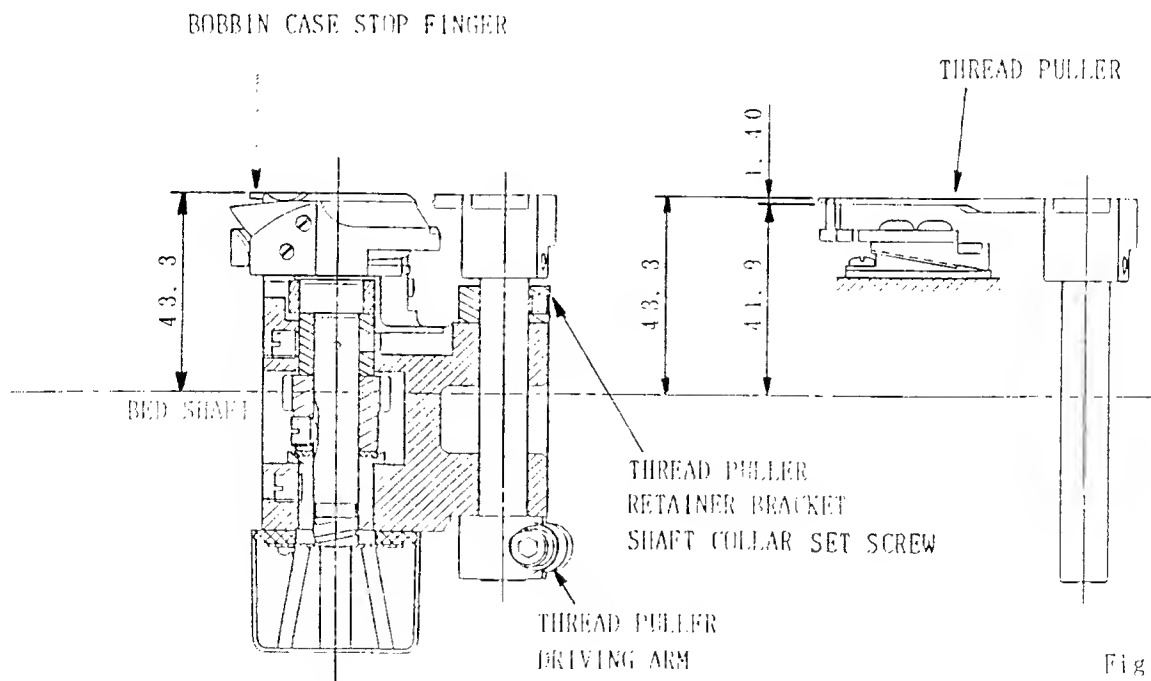


Fig.15

4 - 9 . TO ADJUST THREAD PULLER SUPPORT

- The use of thread puller support is to prevent the thread puller from warping downward. Whenever adjustment is made to the height (up and down position) of the thread puller, be sure to check the thread puller support for correct height.
- The top surface of the thread puller support must be flush with the bottom surface of the thread puller.

• Make adjustment in the following manner.

- 1) Loosen and then pinch tighten thread puller support set screws.
- 2) Loosen eccentric pin set screw.
- 3) Make adjustment by moving thread puller support adjusting block (upper) as required while turning the eccentric pin.

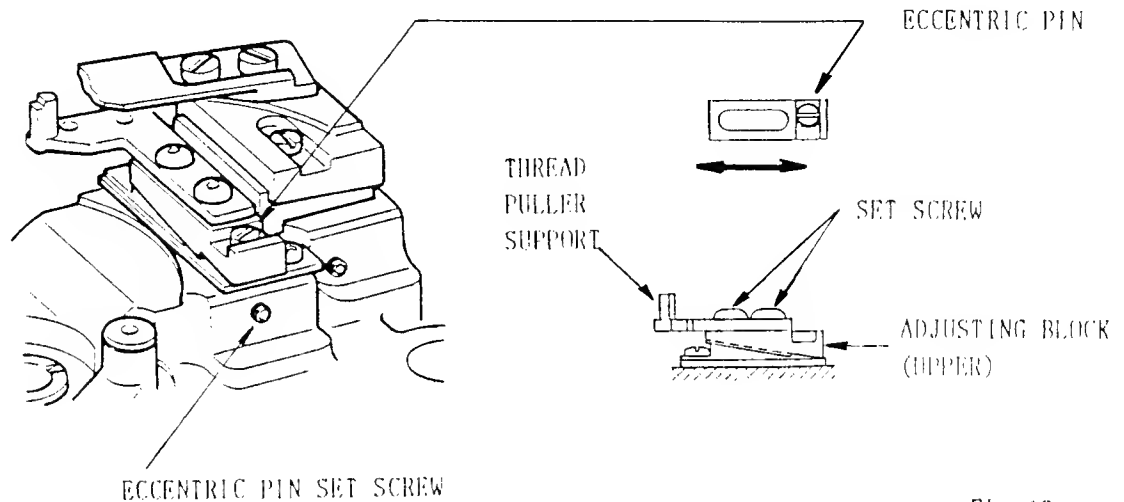


Fig.16

4-10. TO POSITION THREAD PULLER

• The rest position of thread puller should be as shown in the sketch below.

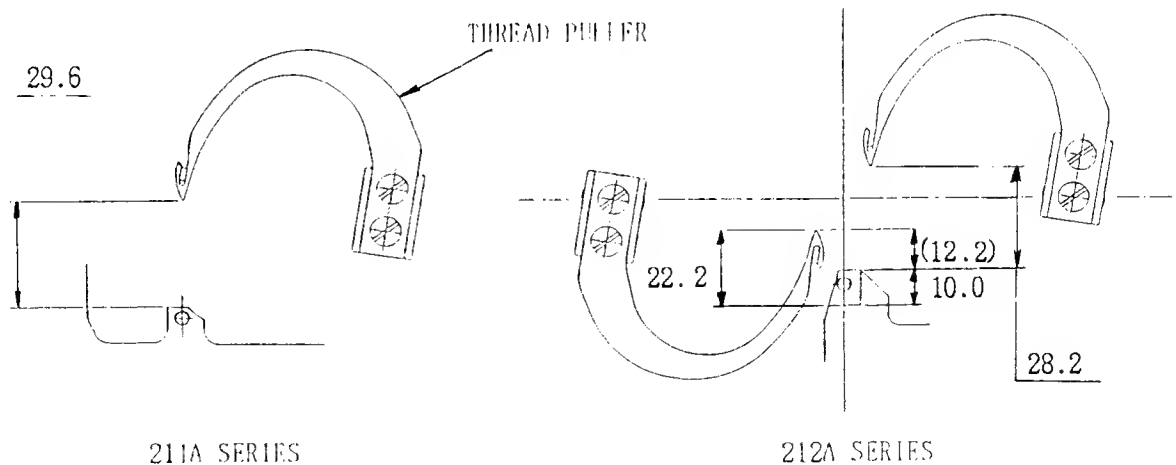


Fig.17

• To make adjustment, loosen thread puller driving arm screw.

Note: 1. Before making adjustment to the position of thread puller, make sure that trimmer rod has already been assembled and adjusted.

2. Thread puller retainer bracket (comp.) must rotate smoothly without up and down play.

4-11. TO ADJUST TRAPPER

- Top surface of trapper should be 6.0mm above the fitting surface of the trapper.
- Use washer to adjust the height of the trapper.

P/N 548228 (t=0.13mm)

- When adjustment is made to the height of the trapper, adjustment should also be made to the trapper regulating screw so that the point end of the screw will lightly contact the trapper.

Note: When assembling the trapper, make sure thread puller support (post) does not interfere with the window of the trapper.

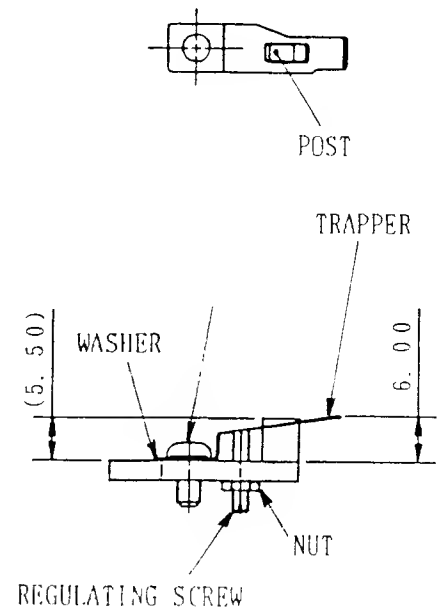


Fig. 18

4-12. TRAPPER - BOBBIN THREAD HOLDING POWER

- Power of trapper to hold bobbin thread after cutting threads should be within the following range.

Tetron	# 8	----	75 ± 10 g
	# 30	----	65 ± 10 g

Cotton	# 8	----	125 ± 20 g
--------	-----	------	----------------

- To make this fine adjustment, use trapper regulating screw.

4-13. TO ASSEMBLE AND ADJUST STATIONARY KNIFE

- Stationary knife should be assembled to the dimension specified below.

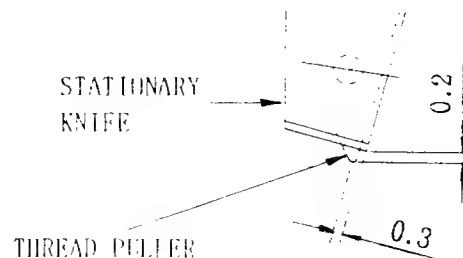
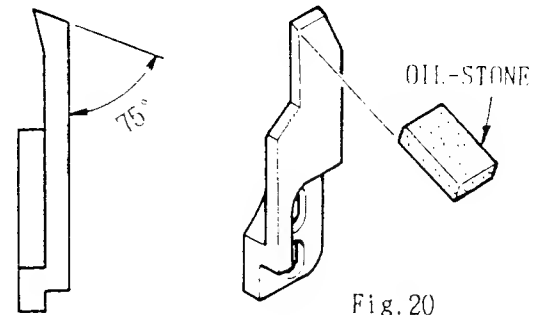


Fig. 19

4-14. SHARPENING STATIONARY KNIFE

- When threads cannot be cut cleanly, sharpen the stationary knife as shown in the sketch below.



4-15. TO ADJUST PRESSURE OF KNIFE

- Pressure of knife should be adjusted so that when the thread hooked onto the thread puller is pulled in the direction of arrow mark, the force required to pull the thread is approximately 300 ± 50 g.

- Make adjustment in the following manner.

- 1) Loosen and pinch tighten stationary knife set screws.
- 2) Loosen eccentric pin set screw and adjust pressure of knife by moving stationary knife adjusting block (upper) as required while turning the eccentric pin.

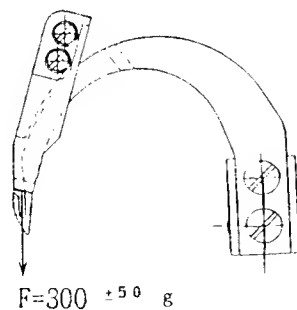
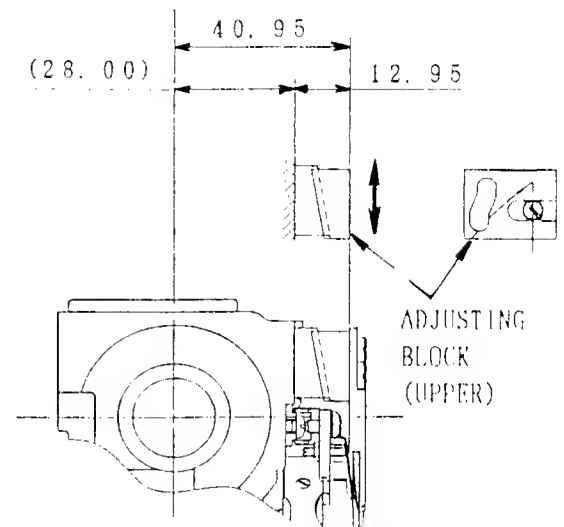


Fig.21

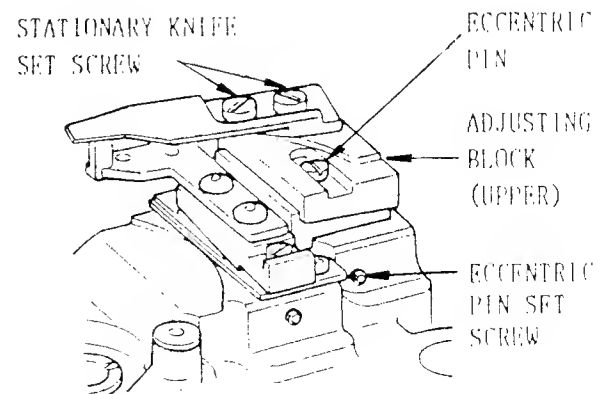


Fig.22

5. DESCRIPTION OF TENSION RELEASING OPERATION

- The motions from when thread trimming signal is turned "ON" until when the thread puller starts its return motion, are the same as explained for the trimming operation.

- 1) When the thread puller reaches the mid-point on its return stroke, a roller on the tension release driving lever fitted to the trimmer lever shaft comes in contact with the inclined section of the tension releasing cam, enabling tension releasing motion "J" to start.

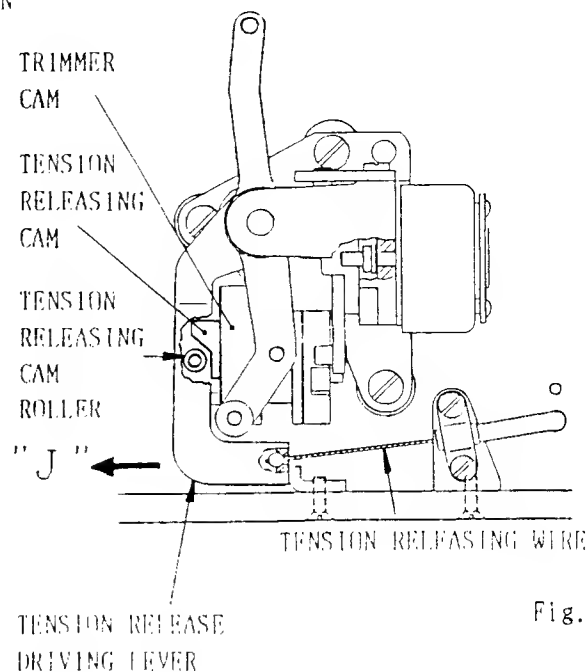


Fig. 23

- 2) This motion "J" is transmitted to the tension releasing ring through the tension releasing wire fitted to the point end of the tension releasing driving lever, tension releasing bell crank and tension releasing rod.

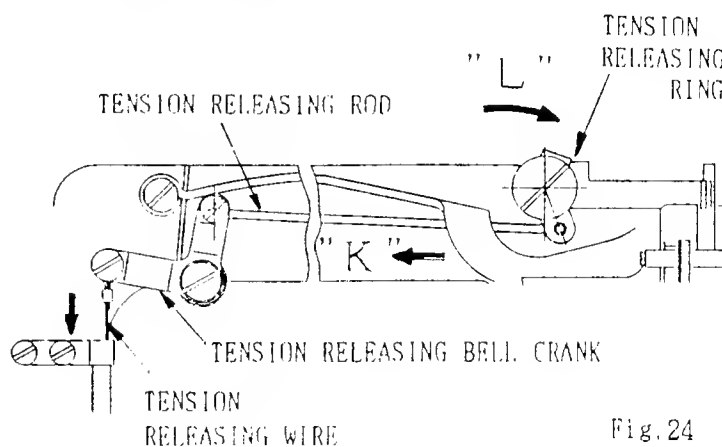


Fig. 24

- 3) As the tension releasing ring rotates, the cam section of the tension releasing ring comes in contact with the tension release plate rod, causing the rod to move in the direction of "M".

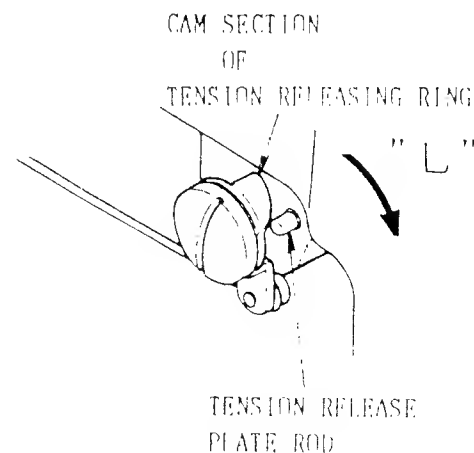


Fig. 25

- 4) The movement of the tension release plate rod in the direction of "M" causes the tension release plate to push the tension releasing pin, allowing tension discs to open.

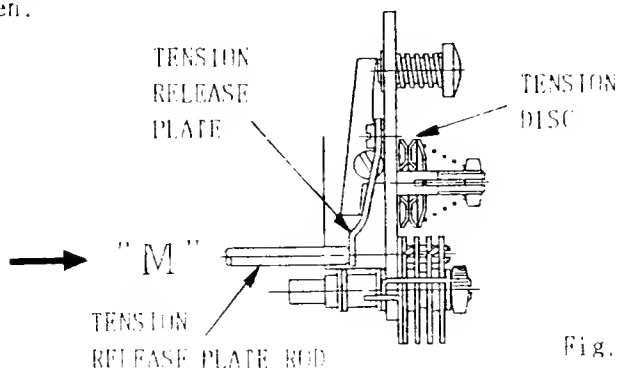


Fig. 26

- 5) After the machine has been run and trimming operation has been completed, the thread puller returns to its rest position. The trimmer lever shaft also returns to its original position by means of the trimmer positive motion cam.
- 6) With the return of the trimmer lever to its original position, the tension releasing cam roller moves away from the cam surface of the tension releasing cam, releasing tension releasing motion and closing the tension discs. This completes all the tension releasing operations.

6 . TO ASSEMBLE AND ADJUST TENSION RELEASING MECHANISM

6 - 1 . TO ASSEMBLE AND ADJUST TENSION RELEASING CAM

- Tension releasing cam must be assembled to trimmer cam without clearance between the two parts.
- Correct timing relationship between tension releasing cam and trimmer cam can be obtained by aligning the notch provided on the trimmer cam with the rear end face of the tension releasing cam.

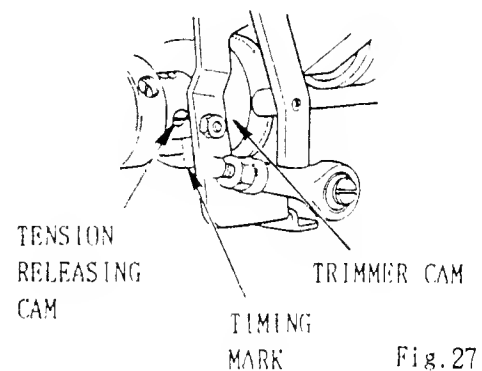


Fig.27

Note: Test sew and actually perform trimming operation in order to make sure that the tension releasing cam is properly timed with the trimmer cam.

6-2 . TO TIME AND ADJUST TENSION RELEASE PLATE ROD

- Tension release plate rod should start to move when the cam portion of the tension releasing ring has rotated approximately 1.0mm clockwise.
- To adjust timing, loosen set screw (2) fastening the tension releasing wire (lower) and move tension releasing wire to the left or right as required.

Move guide tube to the right to advance timing
Move guide tube to the left to retard timing

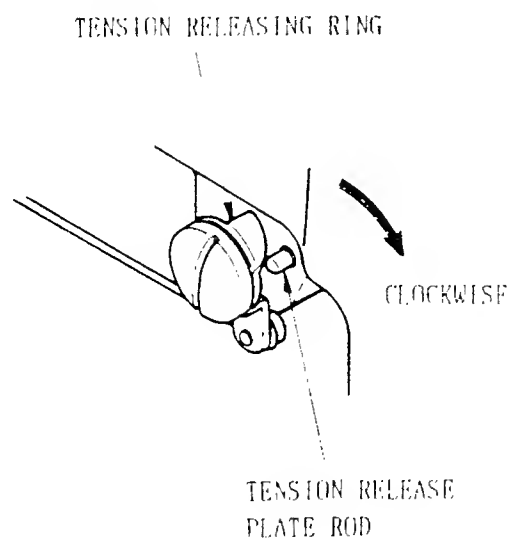


Fig.28

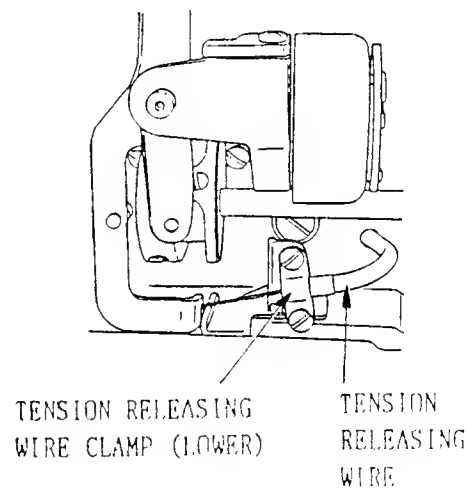


Fig.29

6-3 . OPENING OF TENSION DISCS VIA TENSION RELEASE RING

- Tension discs should start to open when tension release plate rod has moved 1.0mm.
- Opening of tension discs should be 1.0 ~ 1.5mm.

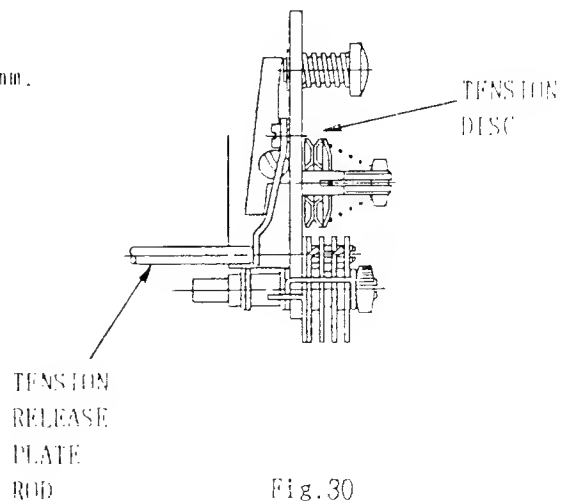


Fig.30

7. TO ASSEMBLE AND ADJUST BACK TACK SOLENOID

- Back tack solenoid is correctly positioned at the factory before shipment.
When back tack solenoid has been removed in order to make some adjustments, replace it in the following manner.

- 1) Distance between adapter (upper) and adapter(lower)

211A166KA, 967KB 212A939KA	}	-----15.0 ± 2.0 mm
211A157KA 212A141GA, 541GA 143GA, 543GA	}	-----12.5 ± 2.0 mm

- 2) Assemble back tack solenoid so that the slot provided on the adapter (upper) is parallel with the slot on the adapter (lower).

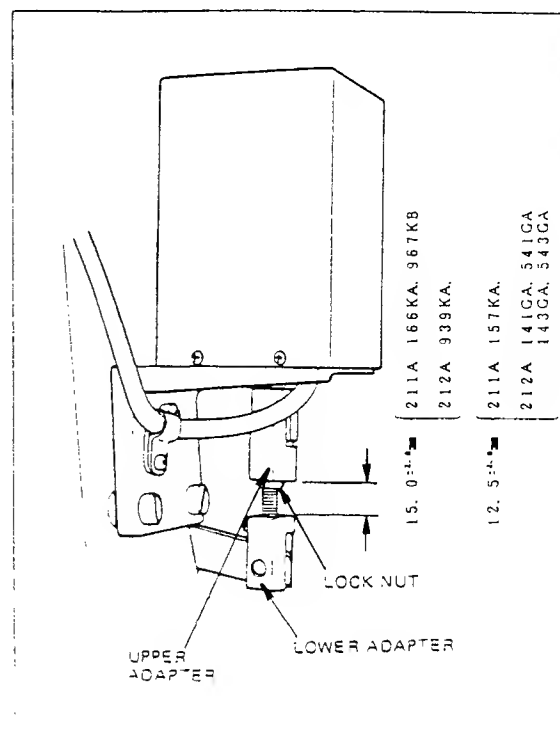


Fig.31

8 . TO ASSEMBLE AND ADJUST WIPER

- Wiper is properly adjusted at the factory before shipment. In case it becomes necessary to make adjustment, follow the procedures described below.

- 1) Distance between hook end of wiper wire and needle point should be 1.5~2.0mm when the hook end of wiper wire is brought nearest to the needle point.
To make adjustment, loosen set screw (O).
- 2) Distance from the needle point to the point end of wiper wire when the wire is brought nearest to the needle point should be 7.0~10.0mm.
To make adjustment, loosen screw (P).

Note: Wiper wire should return to a point where the wiper wire does not interfere with the presser foot when the presser foot is raised.

- 3) The hook end of wiper wire should be approximately 1.5mm inside the needle point.
To make adjustment, loosen screw (Q).

4) Wiper return spring tension

No adjustment is needed in particular, however, in case the wiper is prevented from being returned to its rest position completely due to the use of heavy thread, loosen set screw (R) and adjust tension of wiper return spring.

Note: The tension of the wiper return spring should be as light as possible, yet strong enough to ensure positive thread wiping.

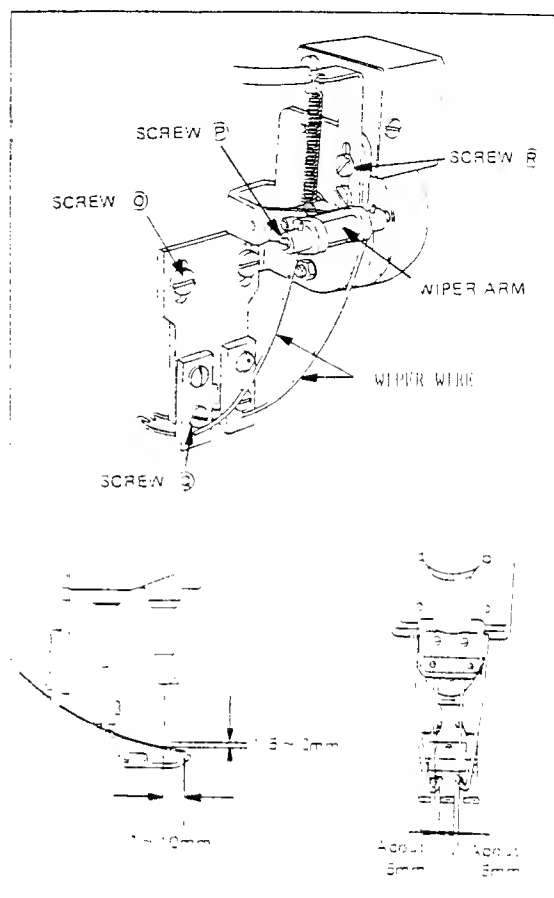


Fig.32

9. MATTERS REQUIRING ATTENTION DURING THREAD TRIMMING OPERATION

9 - 1. ANTI-SPILL SPRING

- Be sure to use anti-spill spring.
If the bobbin continues to rotate more than 1.5 turns after thread trimming, bend the anti-spill spring upward as required to increase the spring pressure.

Note: Care should be taken not to make the anti-spill spring pressure too strong since this will cause too strong bobbin thread tension when light weight thread is used.

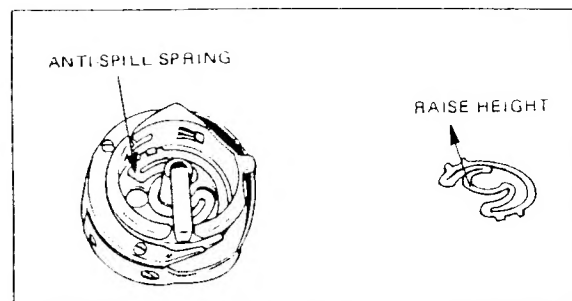


Fig.33

9 - 2. NEEDLE THREAD TAIL REMAINING AT NEEDLE POINT

- With the use of pre-tension, needle thread tail remaining at needle point after thread trimming can be adjusted.
 - Turn pre-tension clockwise to make needle thread tail shorter.
 - Turn pre-tension counter-clockwise to make needle thread tail longer.

Note: When pre-tension is used to adjust needle thread tail remaining at needle point, make sure that such adjustment does not adversely affect the sewing performance.

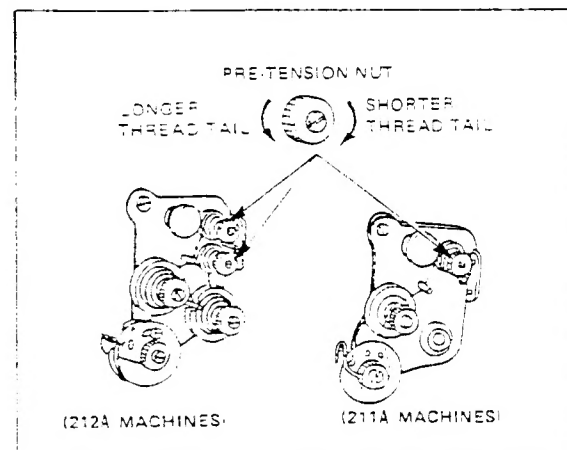


Fig.34

9 - 3. TO PREVENT THREAD FROM PULLING OUT OF NEEDLE AT START OF SEWING

- In case needle thread tail remaining at needle point is too short, thread tends to pull out of needle at start of sewing.
In this case, adjust pre-tension so that needle thread tail will become longer.
(see item 9-2)

- When very stretchy thread is used, it may become necessary to use the slow-start feature.
This can be accomplished by turning the slow-start switch provided on the control box "ON".

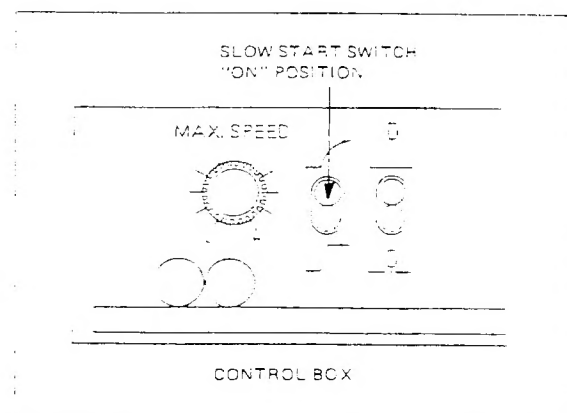


Fig.35

10. TROUBLE - SHOOTING GUIDE

Trouble	Cause	Correction
1. Thread cannot be trimmed. (Thread puller does not function.)	1. Connector for trimmer and backtack is not connected or poor contact.	Be sure connector is connected properly or reconnect connector.
	2. Machine stop position not properly adjusted.	Check and adjust sensor. (See page 6)
	3. Trimmer cam roller does not engage with groove in thread trimmer cam when needle bar is at its lowest point.	Check following items. 1. Thrust position of trimmer cam. (See page 8) 2. Adjustment of trimmer lever stopper. (See page 10) 3. Timing of trimmer positive motion cam. (See page 8) 4. Timing of tension releasing cam. (See page 17)
	4. Poor timing (phase) of trimmer cam.	Adjust timing. (See page 8)
2. Mistrimming of needle thread.	1. Trimmer cam is out of timing.	Adjust timing of trimmer cam. (See page 8)
	2. Rest position of thread puller is not adjusted properly.	Set the rest position of thread puller properly. (See page 13)
	3. Point of thread puller is blunt or bent or has nicks.	Polish the point end of thread puller or replace with new one.
	4. Height of thread puller is not set properly.	Adjust height of thread puller. (See page 12)
	5. Movement of thread controller spring too small.	Adjust thread controller spring stop plate.
	6. Needle and hook parts not properly assembled.	Check following items. a. Clearance between needle and hook. b. Needle to hook timing relationship. c. Movement of opener.
	7. Clearance between throat plate and hook is out of spec.	Adjust clearance between throat plate and hook to spec. (0.85 - 0.95 mm)
	8. Timing of tension releasing cam too fast.	Adjust timing. (See page 17)

Trouble	Cause	Correction
3. Mistrimming of bobbin thread.	1. Thread puller positioned too low.	Adjust height of thread puller. (See page 12)
	2. Hook is positioned too high.	Adjust clearance between throat plate and hook to spec. (0.85 - 0.95 mm)
	3. Point of thread puller is blunt or bent or has nicks.	Polish point of thread puller or replace with new one.
	4. Feed dog is positioned too high.	Adjust height of feed dog.
	5. Needle hole in feed dog too large.	Replace feed dog with one having a smaller needle hole.
	6. Bobbin thread slips out of bobbin case tension spring on bobbin case (latch type).	Rethread bobbin thread.
	7. Bobbin thread is carried away by the point end of thread puller.	Polish point of thread puller or replace thread puller with new one.
4. Needle thread pulls out of needle eye after trimming.	1. Pre-tension is too strong.	Decrease pre-tension. (See page 21)
	2. Needle thread handling parts not smooth enough for free passage of needle thread.	Polish thread handling parts such as thread guides, etc.
	3. Tension disc does not open.	Check and adjust tension releasing parts. (See page 17)
	4. Timing of tension releasing cam too slow.	Advance timing of tension releasing cam. (See page 17)
	5. Timing of trimmer cam too fast.	Retard timing of trimmer cam. (See page 8)
	6. Rest position of thread puller not properly set.	Adjust rest position of thread puller. (See page 13)
	7. Stationary knife out of position.	Adjust position of stationary knife. (See page 14)
	8. Hook portion of thread puller not polished enough.	Polish hook portion or replace thread puller with new one.

Trouble	Cause	Correction
5. Skipping stitches or thread pulls out of needle eye at start of sewing.	1. Needle thread tail after trimming is too short.	Follow the same instructions as given on the preceding item.
	2. Trapper fails to hold down bobbin thread after trimming.	Check following items. 1. Profile of point of trapper. (See page 14) 2. Trapper spring tension. (See page 14) 3. Rest position of thread puller. (See page 13)
	3. Needle is too heavy.	Replace needle with smaller needle.
	4. Needle hole in feed dog too large.	Replace feed dog with smaller needle hole. (Better results can be obtained by using feed dog with $\phi 1.6$ needle hole when sewing with synthetic thread.)
	5. Bobbin thread tension too strong.	Decrease bobbin thread tension.
	6. Machine starting speed too fast.	Use slow start. (See page 21)